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A substantial number of results were obtained during this grant in the area of multivariate function estimation, model building and model identification. There were also invited talks at universities during which some of the results were discussed.

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MULTIVARIATE MODEL BUILDING
AND MODEL IDENTIFICATION
AFOSR-90-0103

Grace Wahba, PI

Final Report

Date Submitted : April 24, 1992

The University of Wisconsin-Madison
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A substantial number of results were obtained during this contract (1990-1991) in the area of multivariate function estimation, model building and model identification. A list of publications follows. Also included is a list of invited talks at meetings and invited talks at universities during which some of the results were discussed.

Publications

Grace Wahba

(i) In print

1. "Spline Models for Observational Data" Vol. 59 in the CBMS-NSF Regional Conference Series in Applied Mathematics. SIAM, Philadelphia, PA (1990). xii + 169 pp.

2. Comment on Cressie, Letters to the Editor, *American Statistician*, **44**, 255-256(1990).

3. Regularization and cross validation methods for nonlinear implicit, ill-posed inverse problems. In "Geophysical Data Inversion Methods and Applications", A. Vogel, C. Ofoegbu, R. Gorenflo and B. Ursin, eds., Vieweg, Wiesbaden-Braunschweig, 3-13 (1990).

4. When is the optimal regularization parameter insensitive to the choice of the loss function? (with Yonghua Wang). *Commun. Statist.*, **A19**, 5 1685-1700, (1990).

5. Minimizing GCV/GML scores with multiple smoothing parameters via the Newton methods (with C. Gu). *SIAM J. Sci. Stat. Comput.* **12**, 383-398 (1991).

6. Book Review of "Ill-Posed Problems in the Natural Sciences" by A. N. Tikhonov and A. V. Goncharsky, eds., in *American Scientist* **79**, 282-283, May-June, 1991.

7. Multivariate model building with additive, interaction, and tensor product thin plate splines. In "Curves and Surfaces" , P.-J. Laurent, A. Le Mehaute and L. L. Schumaker, eds., Academic Press, 491-504 (1991).

8. Multivariate function and operator estimation, based on smoothing splines and reproducing kernels, in "Nonlinear Modeling and Forecasting, SFI Studies in the Sciences of Complexity", Proc. Vol. XII. Eds. M. Casdagli and S. Eubank, Addison-Wesley, 95-112 (1992).

(ii) To Appear

9. Getting better contour plots with S and GCVPACK (with Douglas Bates and Fred Reames). University of Wisconsin-Madison Statistics Dept. TR 865, April 1990, (rev.) *Comp. Stat. Data Anal.*

10. Semiparametric ANOVA with tensor product thin plate splines (with Chong Gu). Purdue University Statistics Department TR 90-61, November, 1990, (rev.) *J. Roy. Stat. Soc. B.*

11. A note on generalized cross validation with replicates (with Chong Gu and Nancy Heckman). University of Wisconsin-Madison Statistics Dept. TR 864. March 1990. (rev.)*Statistics and Probability Letters*

(iii) Submitted

12. Smoothing splines and analysis of variance in functions spaces (with Chong Gu). Purdue University Statistics Department TR 91-29, June, 1991.

(iv) Invited discussion to

Multivariate Adaptive Regression Splines, by J. Friedman, (with C. Gu), *Ann. Statist.*, 19, 115-122 (1991).

Maximum entropy and the nearly black object, by Donoho, Johnstone and Hoch, *J. Roy. Statist. Soc. Ser. B*54, 76 (1992).

Empirical functionals and efficient smoothing parameter selection, by Hall and Johnstone, *J. Roy. Statist. Soc. Ser. B*54, 525 (1992).

Invited lectures, 1990-present

International Conference on Curves and Surfaces, Chamonix, France, June 1990.
Second World Congress of the Bernoulli Society for Mathematical Statistics
    and Probability, Uppsala, Sweden, August 1990.
Stochastic Mathematics, Oberwolfach, Germany, March 1991.
Trends in the Analysis of Curve Data, Heidelberg, Germany, March 1991.
Thirteenth World Congress on Computation and Applied Mathematics (IMACS 91),
    Dublin, July 1991.
Third International Conference on Environmetrics, Madison, WI, October 1991.
Numerical Methods of Approximation Theory, Oberwolfach, Germany, November 1991.
Math Sciences Research Institute, Statistics Workshop, Berkeley, CA April 1992.
Nordic Conference of Mathematical Statistics, Roros, Norway, June 1992.
Inst. Math. Applic., Minneapolis, MN, Environmental Studies Workshop, July 1992.
Santa Fe Institute, Workshop on Theoretical Supervised Machine Learning, August, 1992.
Workkshop on Adjoint Applications in Dynamic Meteorology, Asilomar, CA, August, 1992.
International Workshop on Multivariate Approximation: from CAGD to
Wavelets, Santiago, Chile, October 1992.
Curves, Images, Massive Computation, Oberwolfach, Germany, Feb. 1993.

Invited departmental colloquia at universities, 1990-present.

University of Chicago, University of Michigan-Ann Arbor, Purdue University, Iowa State University-Ames, Stanford University, University of Washington, Seattle.